

Is there a solution to the problem of requirements instability? Some would argue it remains doubtful that this problem can be, or even should be, solved. However, DoD can certainly take steps to alleviate the adverse cost and schedule impacts caused by requirements instability.

#### RECOMMENDATION

*We recommend DoD apply the industry-proven and accepted rule-of-thumb for requirements growth to all of its initial software cost estimates.*

According to Jones, "The average growth of unplanned, unanticipated requirements is about 1 percent to 2 percent per month during the design and coding phases of typical software projects."<sup>16</sup> A 1-percent-per-month growth in requirements is also supported by the results of the recent study conducted by Jeff A. McDowell and Dr. Lewis S. Fichter of Tecolote Research, Inc., which they presented at the 1999 Software Technology Conference.

For example, consider a 10,000-FP software project, which we estimate will take 36 months to develop. (The 36 months does not include installation or fielding of the system.) Using the figure of \$11,232 per FP, the initial software cost

estimate for development of the project comes in at \$112,320,000. Spread over a 36-month period, it equates to a staff productivity of 278 FPs per month. However, if the worst-case, 2-percent-requirements-growth rule-of-thumb is correct, this project actually ends up at 17,200 FPs, a cost of \$193,190,400, and will take approximately 62 months to develop. By failing to consider the inevitable growth in requirements, our original estimate for this project almost doubled in cost, and the schedule slipped 26 months.

#### RECOMMENDATION

*Using this same example, we recommend the following strategy for addressing unplanned, unanticipated requirements. Baseline the contract for the development of the project at 17,200 FPs, 62 months, and \$193,190,400. However, since the requirements for the additional 7,200 FPs currently do not exist, hold them in management reserve. As new requirements come in, the PM sizes and prioritizes them, and then withdraws the appropriate number of FPs from the management reserve and passes them on to the contractor for development.*

For the contractor to meet the original schedule, the PM must still establish a deadline for the incorporation of new requirements. This technique gives the PM

much more latitude in dealing with the adverse effects of requirements instability on the cost and schedule of a project. By incorporating the requirements growth rule-of-thumb into the initial contract baseline, the PM can shift the deadline for incorporating new requirements much further to the right on the project's calendar, without affecting the project's original cost or schedule. Not only does this technique generate more accurate and realistic cost estimates, but it also gives PMs the flexibility required to better satisfy changing needs of their customers.

#### Now is the Time

The time for change is now as DoD continues losing \$18 billion per year reworking its software, while only 16 percent of its software development is completed on time and within budget. To reverse this trend, DoD must do a better job defining operational requirements, estimating the size of the software, and cultivating well-trained software cost estimators. The training is available; the need is substantial; the timing is right.

**Editor's Note:** For questions, comments, or a copy of the references cited in this article, contact Nelson at [nelsonm@lee.army.mil](mailto:nelsonm@lee.army.mil).

## DoD SELECTS VENDORS FOR PUBLIC KEY INFRASTRUCTURE PILOT

**T**he Department of Defense has made its initial selection of vendors to enable secure, electronic business services with private industry.

Operational Research Consultants Inc., and Digital Signature Trust Co. are the first two candidates selected to supply the Department with Class Three Interim External Certification Authorities [IECA] for its public key infrastructure. This capability will allow DoD to electronically communicate with industry by enabling secure, private electronic business and paperless contracting. IECAs will be used to provide non-DoD personnel with certificate services compatible with the Department's public key infrastructure.

In May 1999 the Department released a solicitation for IECAs to support vendors conducting business with the Paperless Contracting Wide-Area Work Flow, Electronic Document

Access, and Defense Travel System applications. Operational Research Consultants Inc., and Digital Signature Trust Co. are the first two candidates to successfully complete the testing, policy, and procedural requirements for IECAs. More IECA selections will be announced, as available.

Selection of these two vendors is a significant milestone in the rollout of the Department's public key infrastructure since it promotes broader industry participation. In addition, this pilot should provide additional data to refine the Department's requirements and procedures for use of future external certificate authorities.

**Editor's Note:** This information, published and released Sept. 21 by the Office of the Assistant Secretary of Defense (Public Affairs), is in the public domain at <http://www.defenselink.mil/news>.